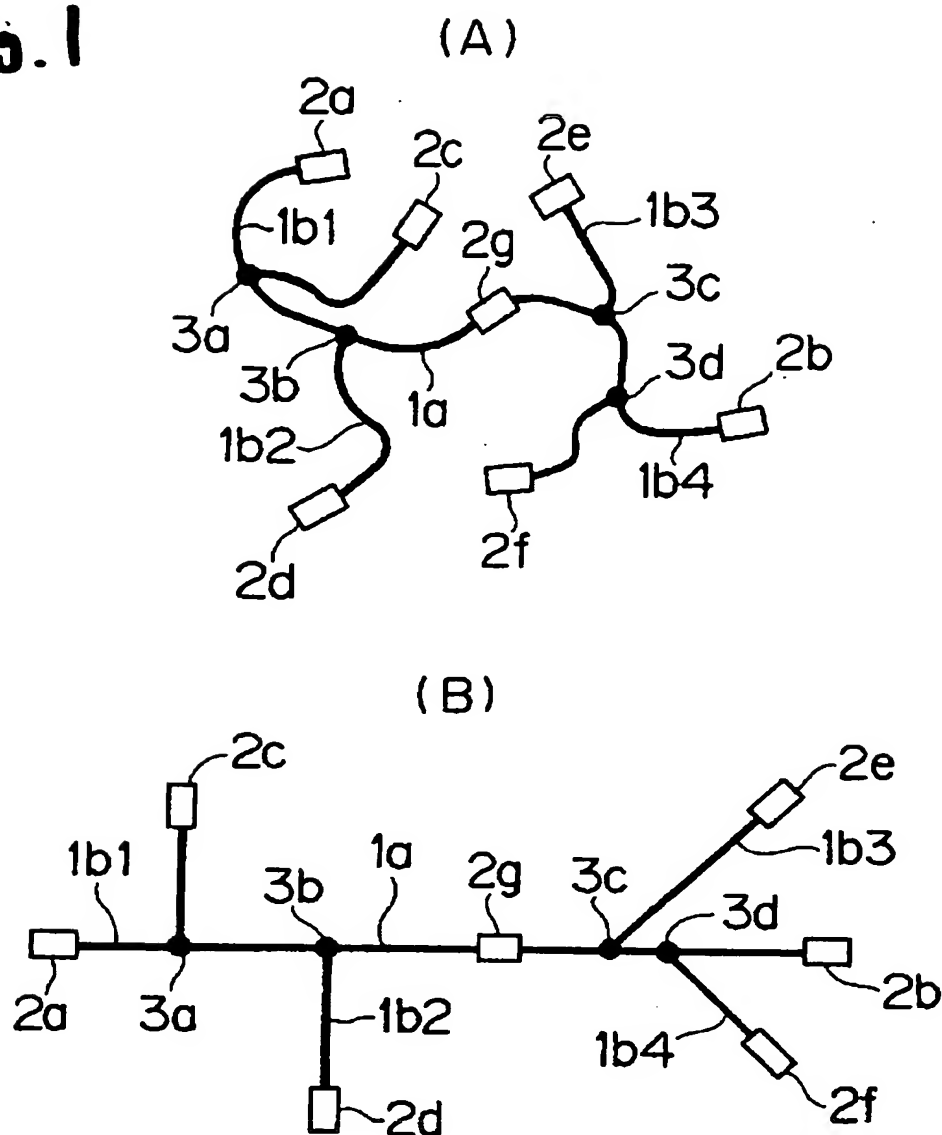
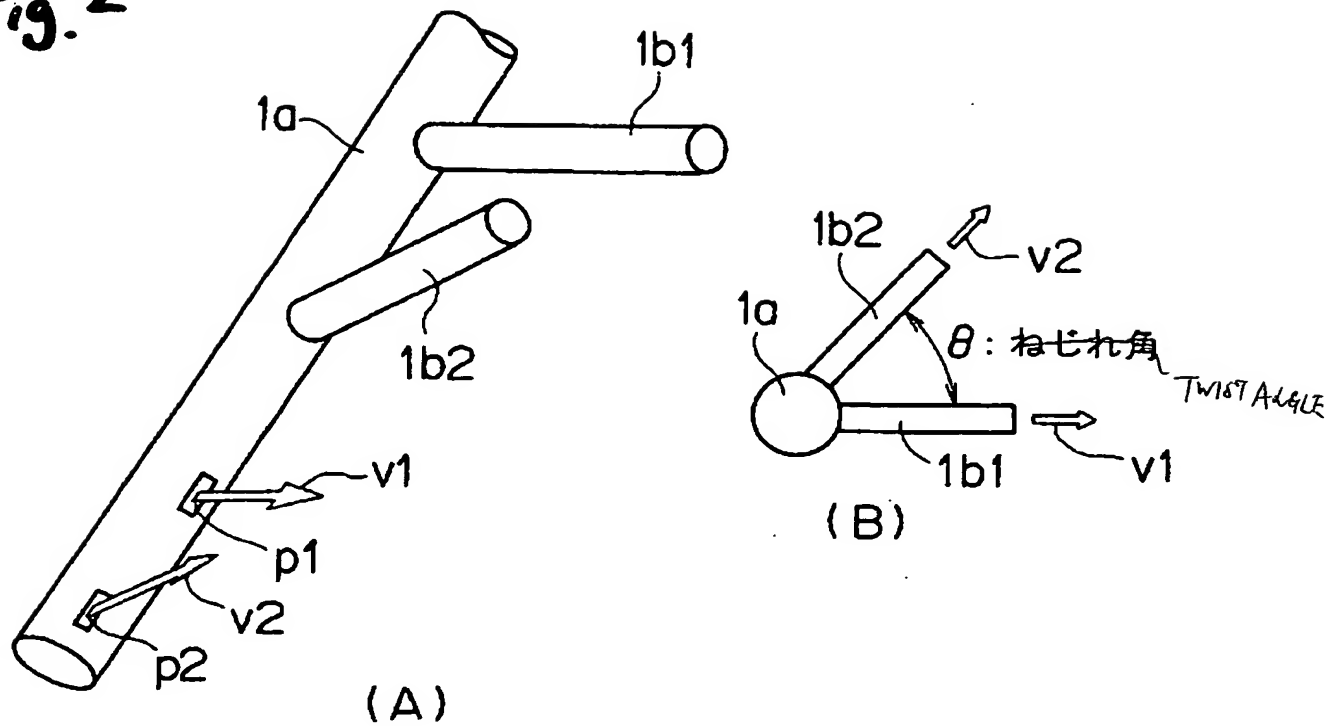


Fig. 1



~~Fig. 2~~
Fig. 2



RESTRAINED DEGREES OF FREEDOM

[illegible]

Fig. 4

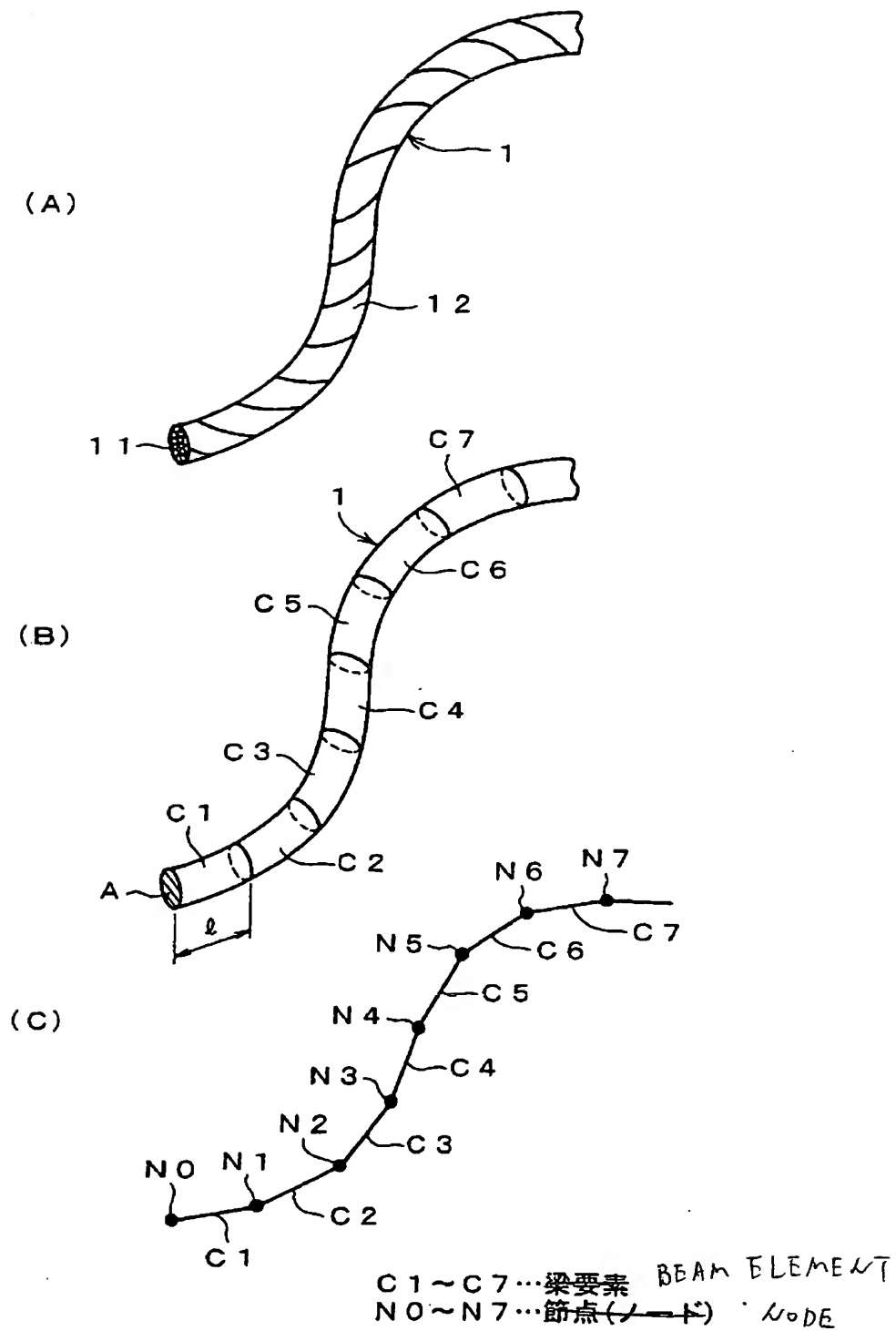


Fig. 5

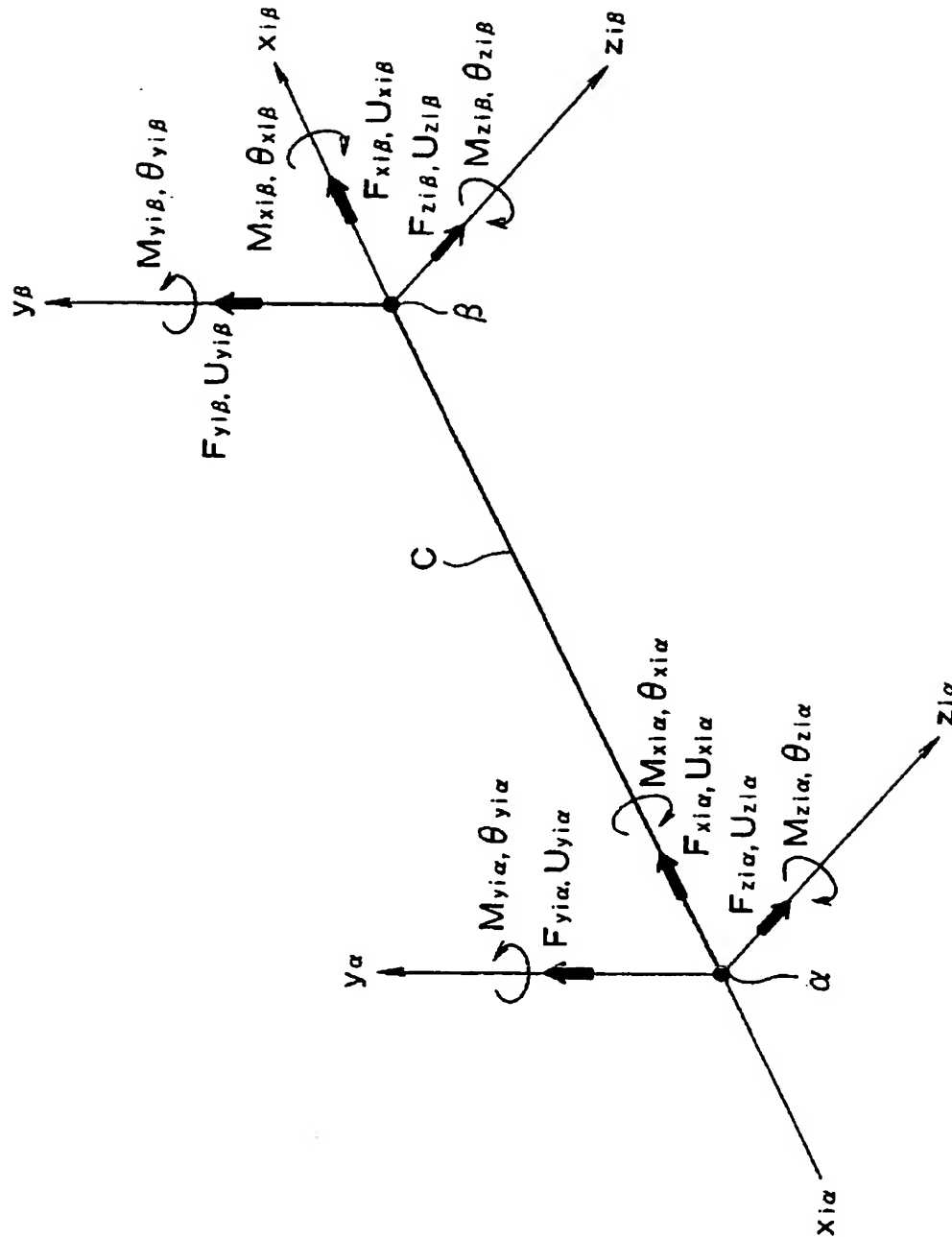
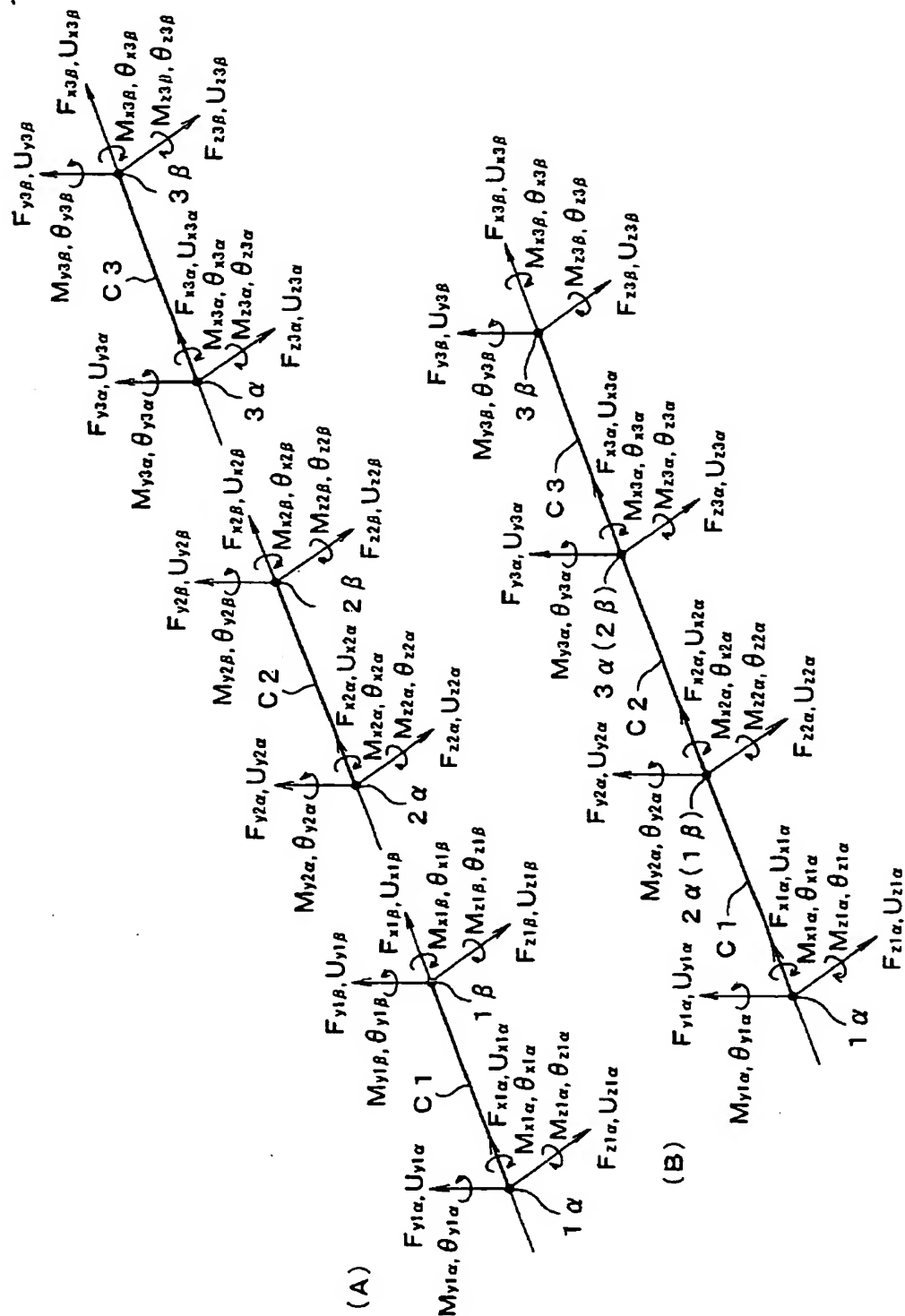


Fig. 6



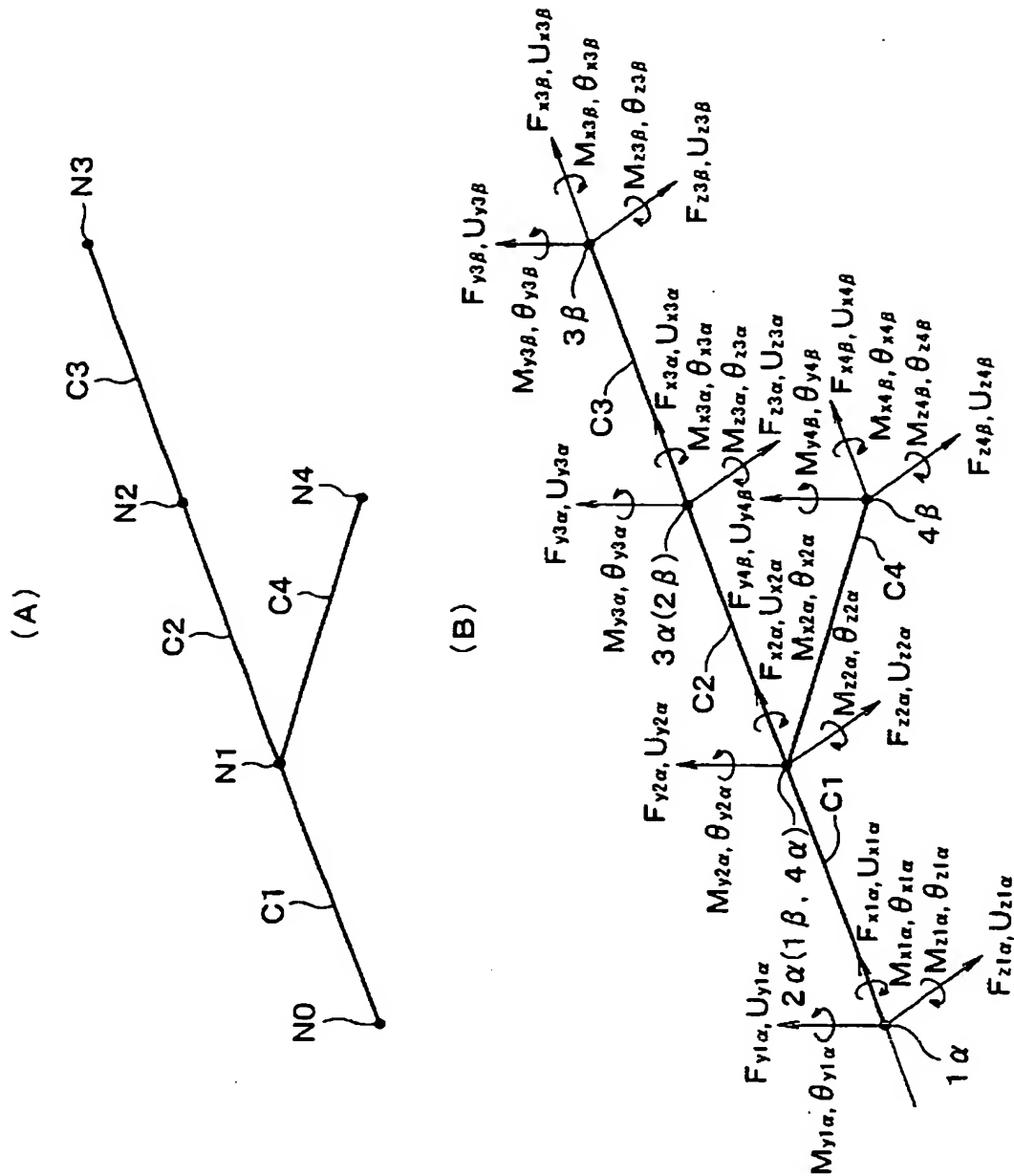



Fig. 8

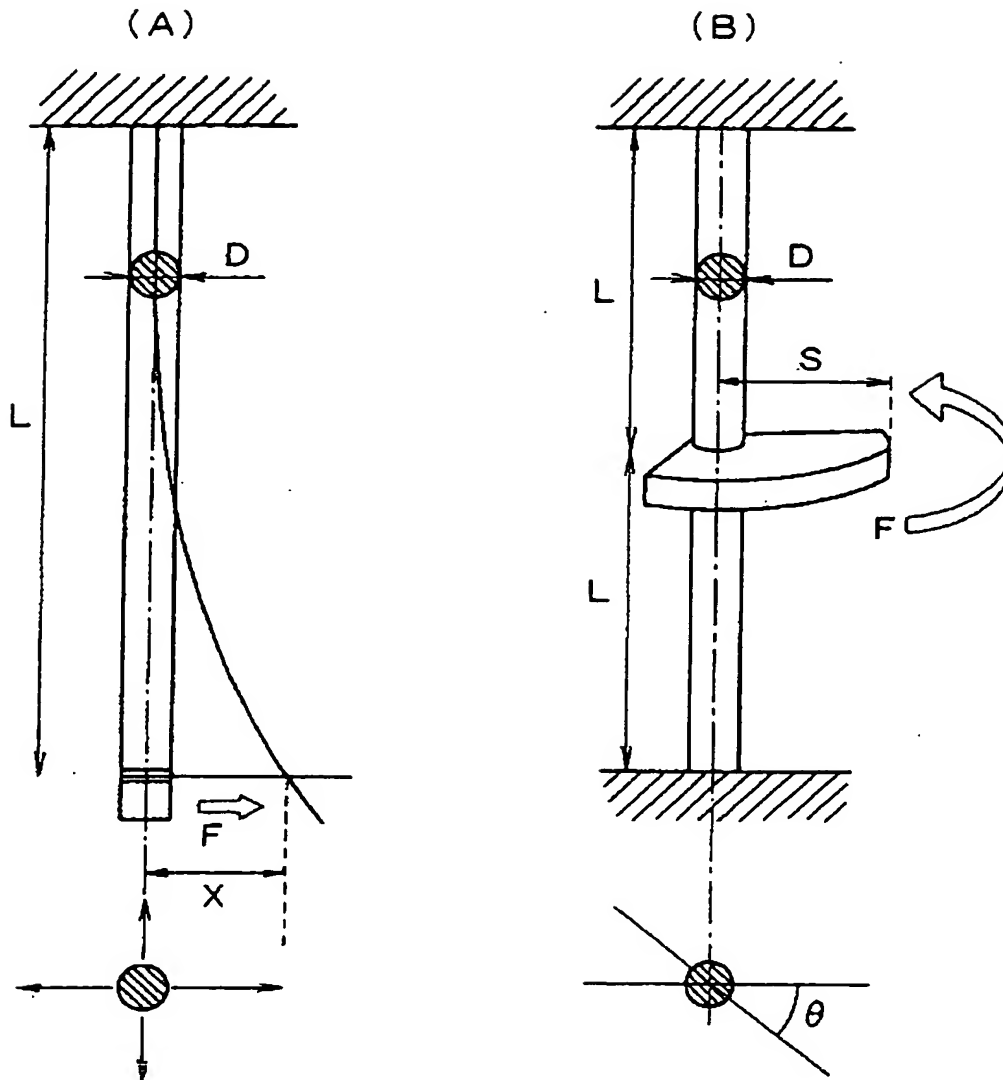
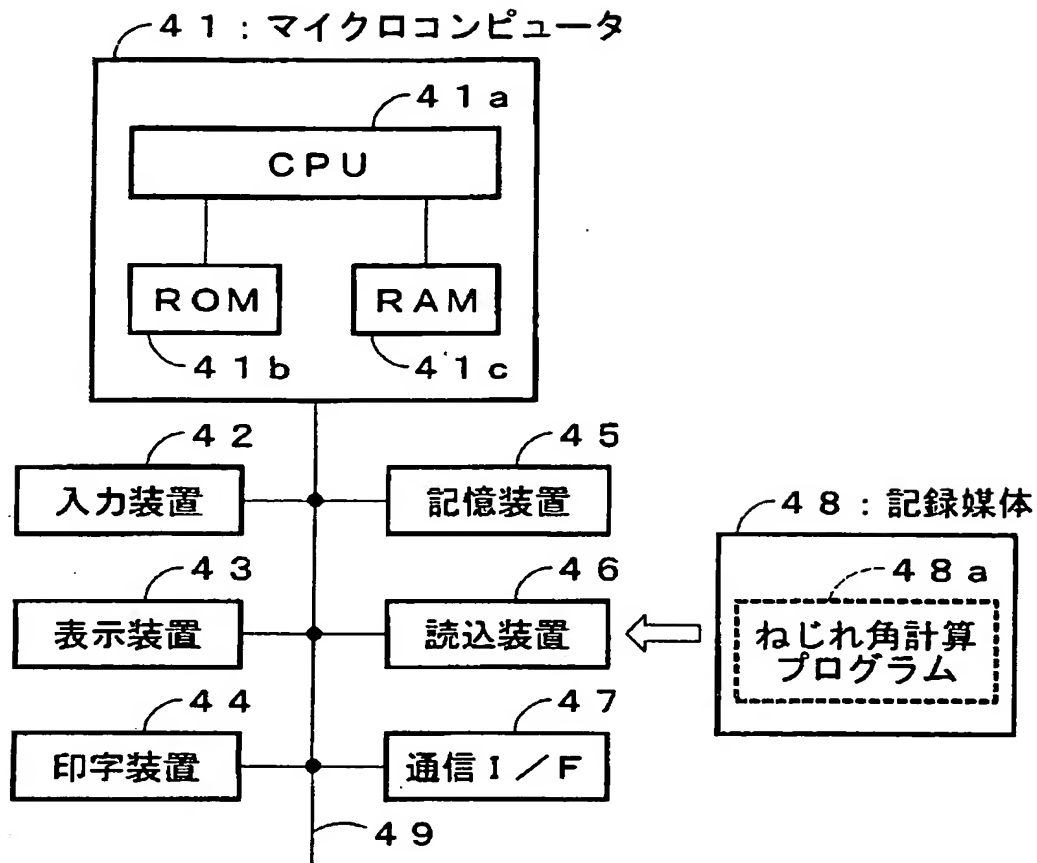


Fig. 9



- 41 MICROCOMPUTER
- 42 INPUT DEVICE
- 43 DISPLAY DEVICE
- 44 PRINT DEVICE
- 45 STORAGE DEVICE
- 46 READ DEVICE
- 47 COMMUNICATION I/F
- 48 STORAGE MEDIUM
- 48a TWIST ANGLE CALCULATION PROGRAM

Fig. 10

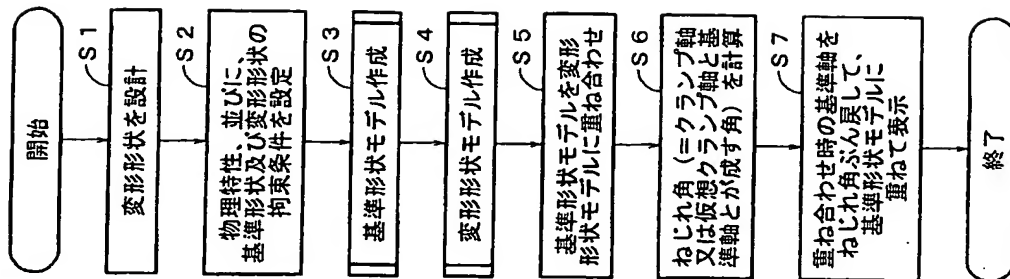


Fig. 10

START

S1 DESIGN DEFORMED SHAPE

S2 SET PHYSICAL PROPERTIES, AND RESTRAINT CONDITIONS OF REFERENCE SHAPE AND DEFORMED SHAPE

S3 PRODUCE REFERENCE SHAPE MODEL

S4 PRODUCE DEFORMED SHAPE MODEL

S5 SUPERIMPOSE REFERENCE SHAPE MODEL ON DEFORMED SHAPE MODEL

S6 CALCULATE TWIST ANGLE (= ANGLE FORMED BY CLAMP AXIS OR VIRTUAL CLAMP AXIS AND REFERENCE AXIS)

S7 RETURN REFERENCE AXIS AT SUPERIMPOSITION BY TWIST ANGLE, AND DISPLAY WITH BEING SUPERIMPOSED ON REFERENCE SHAPE MODEL

END

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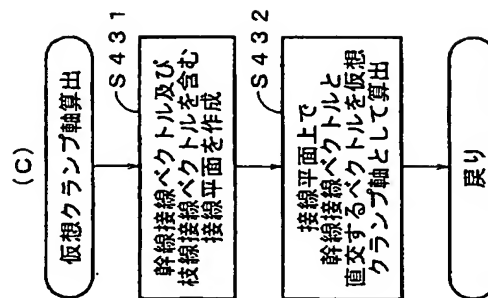
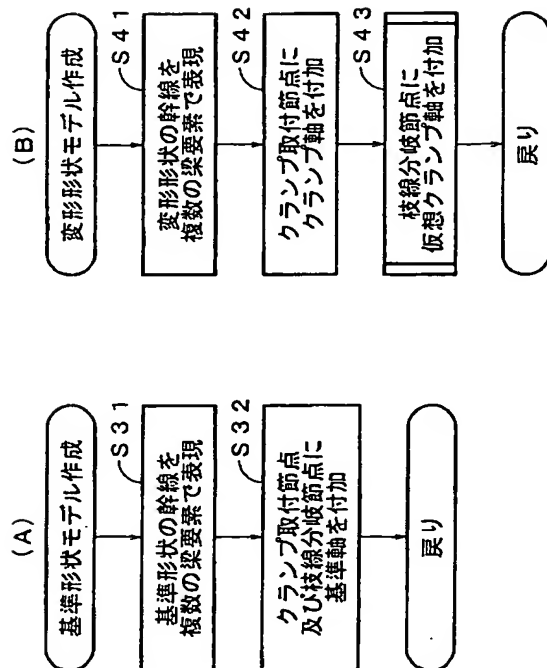


Fig. 11(A)

PRODUCTION OF REFERENCE SHAPE MODEL

S31 EXPRESS TRUNK WIRE OF REFERENCE SHAPE BY PLURAL BEAM ELEMENTS

S32 ADD REFERENCE AXIS TO CLAMP ATTACHMENT NODE AND BRANCH WIRE BRANCH NODE

RETURN

FIG. 11(B)

PRODUCTION OF DEFORMED SHAPE MODEL

S41 EXPRESS TRUNK WIRE OF DEFORMED SHAPE BY PLURAL BEAM ELEMENTS

S42 ADD CLAMP AXIS TO CLAMP ATTACHMENT NODE

S43 ADD VIRTUAL CLAMP AXIS TO BRANCH WIRE BRANCH NODE

RETURN

FIG. 11(C)

CALCULATION OF VIRTUAL CLAMP AXIS

S431 PRODUCE TANGENT PLANE CONTAINING TRUNK WIRE TANGENT VECTOR AND BRANCH WIRE TANGENT VECTOR

S432 CALCULATE VECTOR WHICH IS PERPENDICULAR TO TRUNK WIRE TANGENT VECTOR IN TANGENT PLANE, AS VIRTUAL CLAMP AXIS

RETURN

Fig. 12

図 12

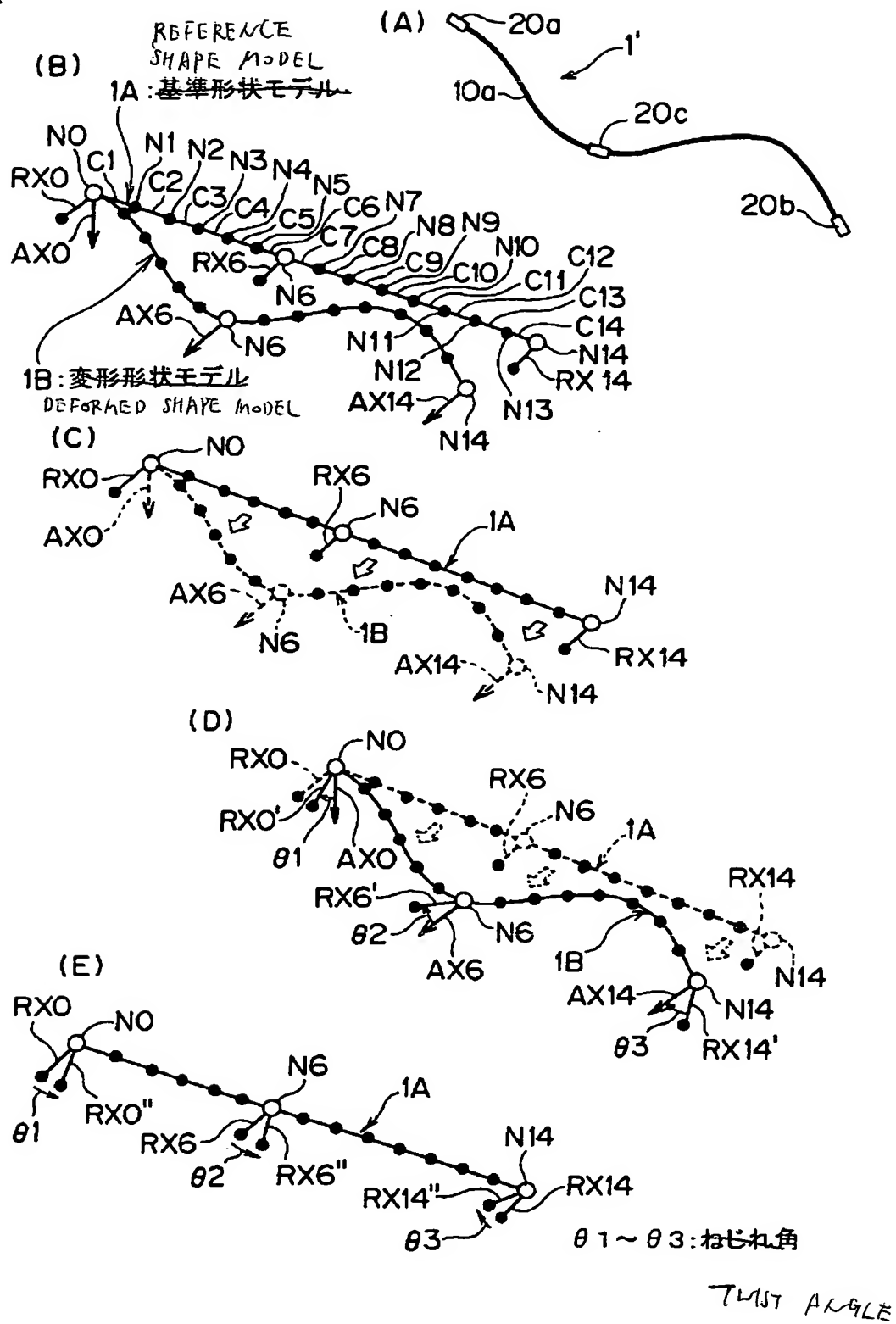


Fig. 13

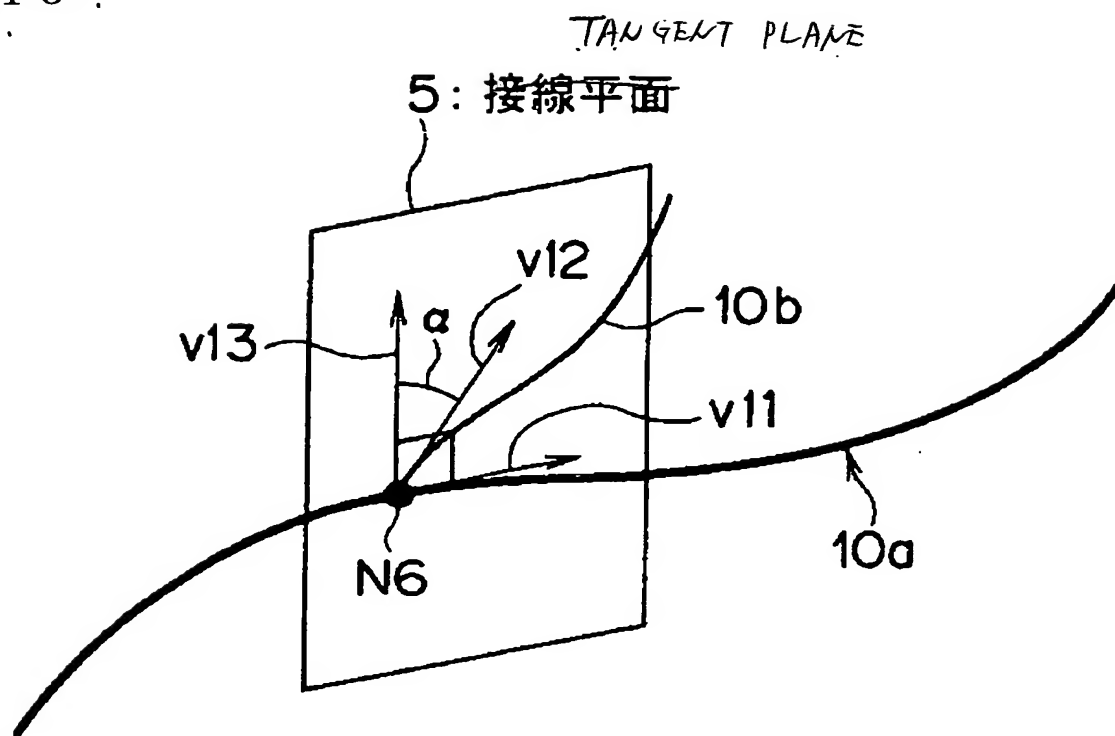


Fig. 14
図 14

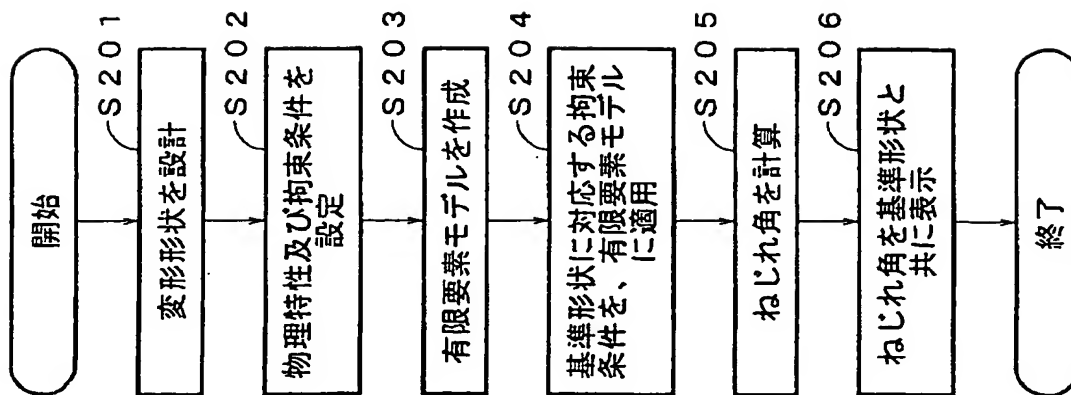


FIG. 14

START

S201 DESIGN DEFORMED SHAPE

S202 SET PHYSICAL PROPERTIES AND RESTRAINT CONDITIONS

S203 PRODUCE FINITE ELEMENT MODEL

S204 APPLY RESTRAINT CONDITIONS CORRESPONDING TO

REFERENCE SHAPE, TO FINITE ELEMENT MODEL

S205 CALCULATE TWIST ANGLE

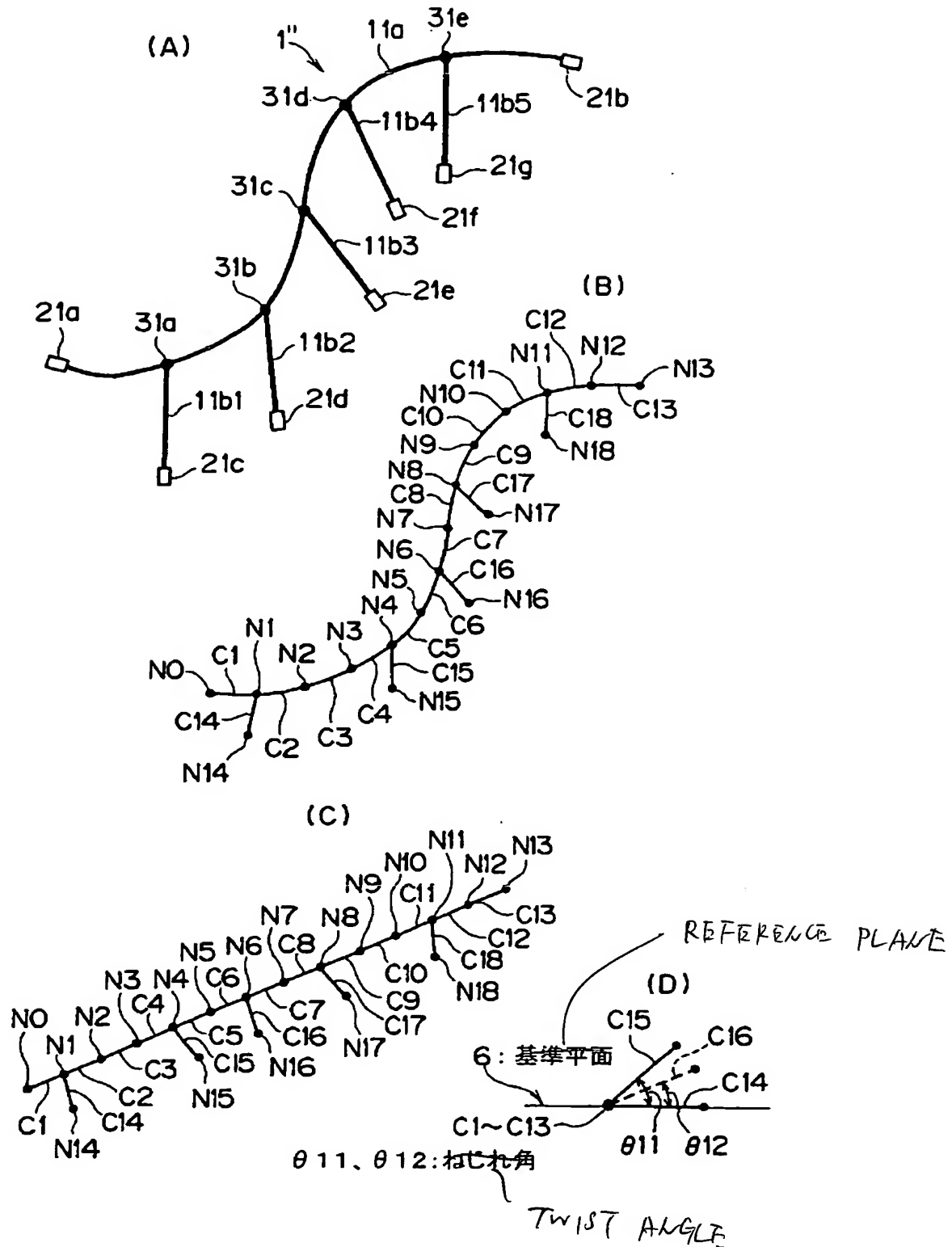
S206 DISPLAY TWIST ANGLE TOGETHER WITH REFERENCE SHAPE

END

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Fig. 15

Fig. 15



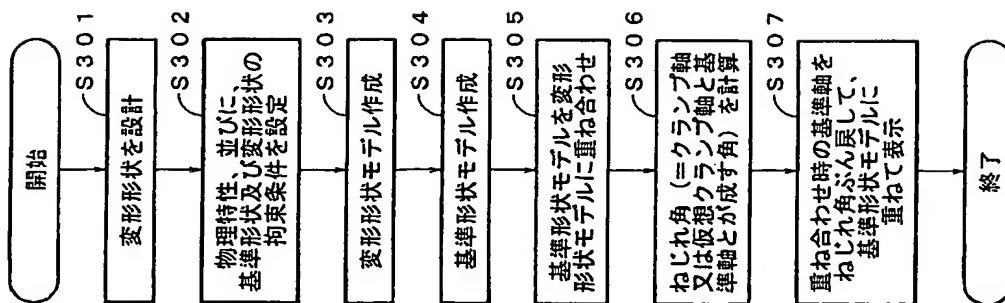


FIG. 16

START

S301 DESIGN DEFORMED SHAPE

S302 SET PHYSICAL PROPERTIES, AND RESTRAINT CONDITIONS OF
5 REFERENCE SHAPE AND DEFORMED SHAPE

S303 PRODUCE DEFORMED SHAPE MODEL

S304 PRODUCE REFERENCE SHAPE MODEL

S305 SUPERIMPOSE REFERENCE SHAPE MODEL ON DEFORMED
SHAPE MODEL

10 S306 CALCULATE TWIST ANGLE (= ANGLE FORMED BY CLAMP AXIS OR
VIRTUAL CLAMP AXIS AND REFERENCE AXIS)

S307 RETURN REFERENCE AXIS AT SUPERIMPOSITION BY TWIST
ANGLE, AND DISPLAY WITH BEING SUPERIMPOSED ON REFERENCE SHAPE MODEL
END

Fig. 17

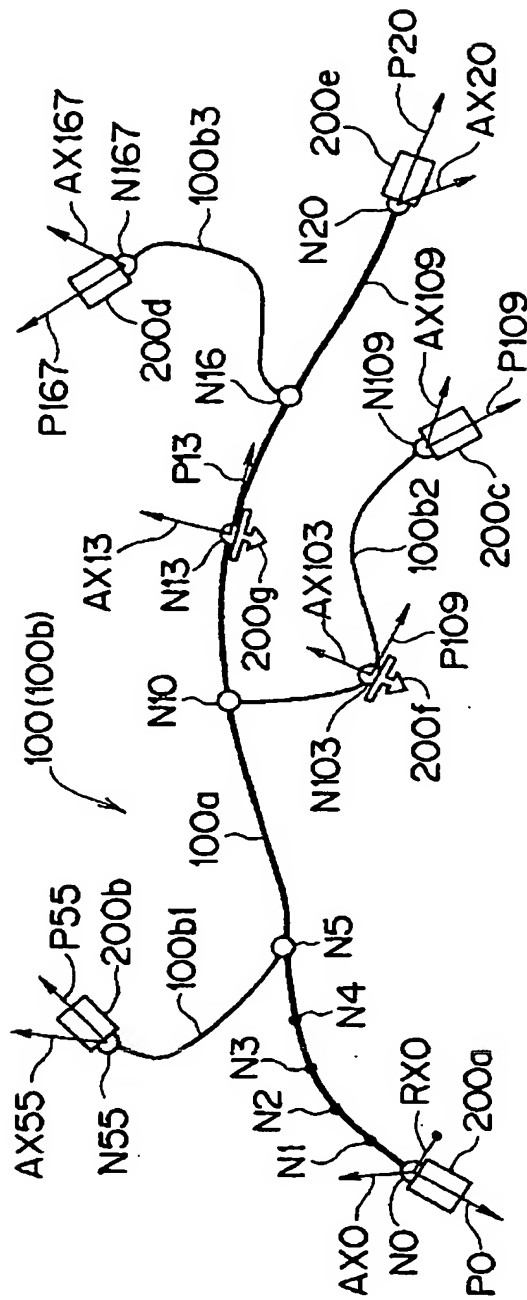


Fig. 18

118

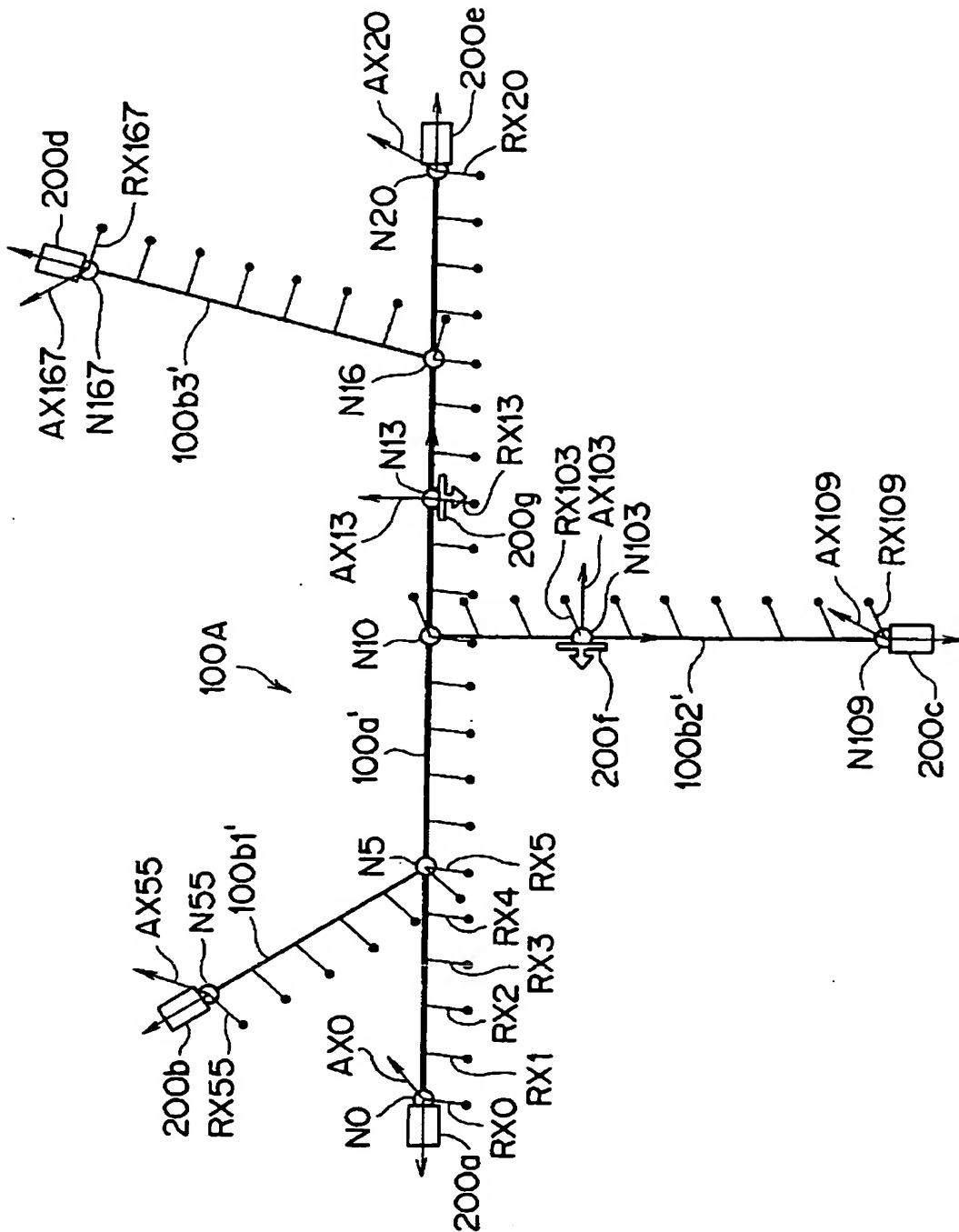
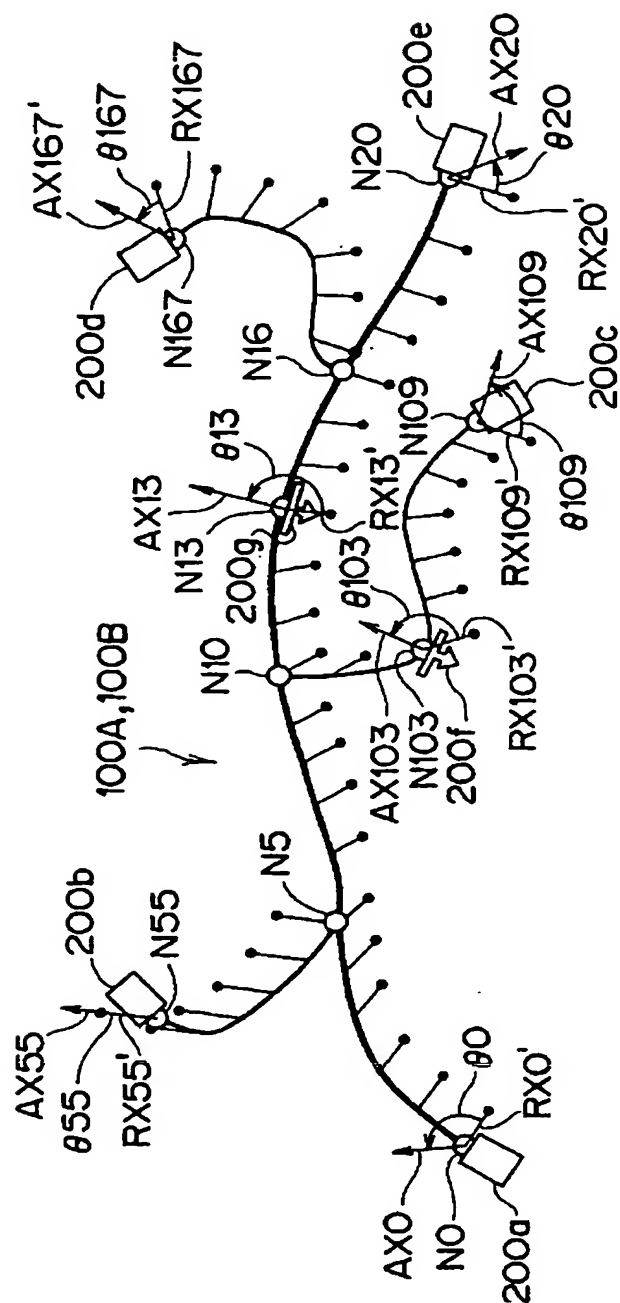


Fig. 19

19



$\theta 0, \theta 13, \theta 20, \theta 55, \theta 103, \theta 109, \theta 167$: ねじれ角

Twist Angle

Fig. 20

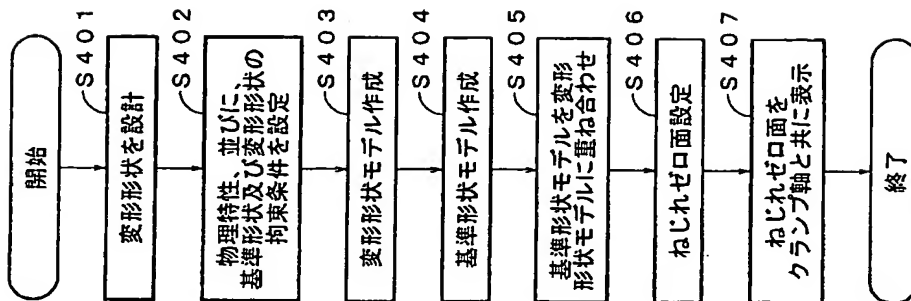


FIG. 20

START

S401 DESIGN DEFORMED SHAPE

S402 SET PHYSICAL PROPERTIES, AND RESTRAINT CONDITIONS OF REFERENCE SHAPE AND DEFORMED SHAPE

S403 PRODUCE DEFORMED SHAPE MODEL

S404 PRODUCE REFERENCE SHAPE MODEL

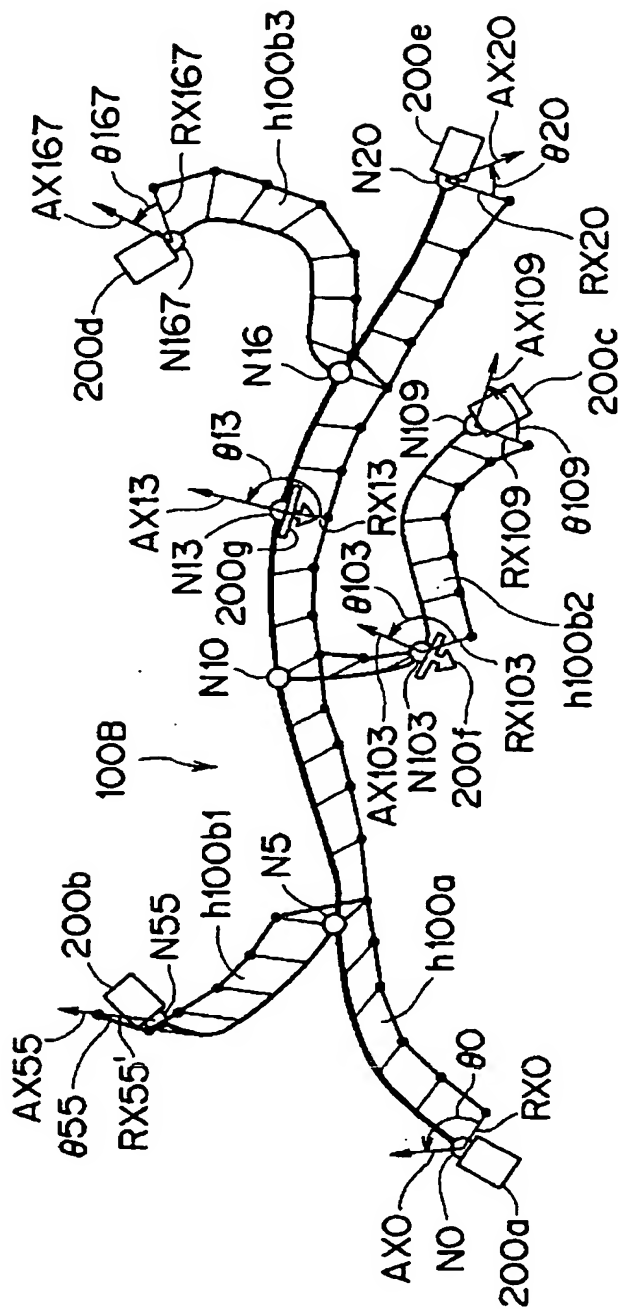
S405 SUPERIMPOSE REFERENCE SHAPE MODEL ON DEFORMED SHAPE MODEL

S406 SET TWIST-FREE PLANE

S407 DISPLAY TWIST-FREE PLANE TOGETHER WITH CLAMP AXIS

END

Fig. 21



h100a, h100b1, h100b2, h100b3 : ねじれ平面

TWIST : FREE PLANE

Fig. 22

22

